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PROGRESS IN THE U. S. NAVAL AVIATION SAFETY PROGRAMME

BY

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In keeping with the general subject of this year's conference, namely, "Medical Aspects of Protection against A.B.C. Warfare", I will first make mention of some devices in development and use by the U. S. Navy for the aircrew of Carrier Attack Aircraft. Subsequently, I will discuss some of the more general aspects of the status of the U. S. Naval Aviation Safety program.

To provide protection of the aviators retina from thermal burns due to the intensive light of a thermonuclear explosion to which he might be exposed in the target area, a special visor has been developed. Such a device, to be suitable, must be acceptable to the pilot for normal flight conditions, especially with regard to weight and ease of installation. It must afford a minimal degree of restriction to vision or visual fields. It must trigger automatically when exposed to intensive light since normally a pilot has no time for manual activation. The visor and associated equipment currently available is shown in the following pictures --

(Slides 35 mm; movie 16 mm, silent - authors narration, tab (a), unclassified)

The general status at Naval Aviation Safety is healthy. The accident rates have been steadily reduced over the years to an almost unbelievable low of approximately 1.25 accidents per 10,000 flight hours. Naval Aviation, with its aircraft carrier launch and landing requirements, remains a hazardous endeavor, but the operational flexibility and effectiveness of the fast attack carrier force has justified its continued employment. Improvements are continually being made, the larger, faster

carrier deck, nuclear propulsion, sophisticated radar and optical landing aids, improved maintenance and intensive pilot training, all contributing to a reduction in operational launch and landing accidents. The most critical phase remains night landing, especially in poor weather with reduced visibility. With the great reduction in visual cues which are available to the pilot to assist in proper attitude, speed and line-up control of his aircraft, a greater landing hazard is inevitable. One significant and recent breakthrough in this area is the so-called "white flood lighting for the aircraft carrier deck". For some years, carrier decks have been flood-lighted with red light to facilitate on-deck handling. This feature greatly reduced night accidents and injury on the carrier deck but afforded little help for the pilots of landing aircraft. Various lighting schemes were extensively tested and it was finally determined that white flood lighting offered the best solution. Of course the problem of night adaptation was an imposing one, being feared as a detrimental factor for launch, and especially for missed landings (Bolter) on the canted deck with resulting go-around. Test and operational personnel who conducted the evaluations have reported that loss of night adaptation presented no problem, and the lighting greatly facilitated the night carrier landing.

Another objection comes from the ships commanding officer and navigator regarding exposure to enemy sighting (particularly submarine) and loss of visual reference for surface navigation. This factor has not been completely resolved. The next short film will show some aircraft carrier landings by day and night with current lighting, and some night landings with white flood-lighted deck.

(16 mm movie, narration tab (b), unclassified).

Another advance in the Aviation Safety field is being fostered by the Naval Aviation Safety Center and by the Biotechnology Systems Group of Douglas Aircraft Company under Navy contract. This program is known as HERAP, which is the acronym for "Human Error Research and Analysis Program". We have known that about 60 per cent of aircraft accidents can be attributed to some type of human error, be it pilot, ground crew, maintenance, air controller or otherwise. The HERAP program proposes to conduct a 20 year longitudinal study, by systems analysis, of the human factors involved in naval flight missions and through statistical identification of the points of failure (error), find methods of avoidance (accident prevention). This prodigious undertaking will be essentially a computerization of data, with some extensions of the present statistics gathering and analyzing which is done by the Safety Center in its efforts to identify the human factor in aircraft accidents. Current accident investigation reports, including the extensive Medical Officers' Report of Aircraft Accident, will be modified to be compatible with the data bank. Thus the U. S. Navy continues its unending effort to improve aviation safety, reduce the loss of multimillion dollar aircraft, and invaluable aircrew. The motive is not only budgetary and humanitarian, but is also aimed toward greater operational effectiveness and reliability.

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FILM NARRATION

Tab (a)

The movie demonstrates an aircrewman donning the equipment which he would wear in a possible nuclear explosion environment. The flight clothing is all white, to reduce heat absorption. Operational testing has demonstrated that the equipment quickly gets dirty and oily if used in daily flight and thus loses its protective features. Therefore, this equipment is fitted to the pilot, then stored until needed. The specially adapted helmet, seen here in the film, accepts the double-walled tented visor into a sliding track. Electrical contacts are made which lead from the photoelectric triggering device attached to the helmet. The small wires seen here lead to a mercury cell, long-life battery pack which is small enough to be carried in the pilot's flight clothing.

When a high intensity light source and a rapid gradient of light intensity is sensed, the triggering device generates a signal to the visor and a small explosive charge is activated in its upper segment. This drives a dense mixture of carbon black and glycerin into the interspace of the visor, instantly reducing the light transmission to approximately 4%. The opacity is irreversible in this model. The pilot releases the goggle at an appropriate time interval and replaces it with a fresh one. A newer type of device in development is a visor which will "opaque" under high intensity light and recover its transmissibility spontaneously within a few seconds when the light source reduces. This visor is shown here in the movie.

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FILM NARRATION

Tab (b)

This movie film depicts flight operations from an attack aircraft carrier. The aircraft are catapulted to flying speed off the bow and waist catapults at the rate of one every 15 seconds. For landing, the planes are directed in an approach by radar, then the pilot aligns himself with the angle deck center line and flies a fixed attitude (angle of attack/airspeed) and rate of descent utilizing the optical landing system as a guide to establish a 3° glide slope. He lands with partial power on, and in the event the hook does not engage one of the four arresting cables, goes to full power and flies around for another approach.

Visual cues at night are seen to be greatly reduced and optical illusions abound. The white flood-lighted deck replaces for the pilot many of the daytime visual cues and makes it easier for him to assess his position (high or low), his line-up and relative speed. The greatest difficulty is not landing from a "good" approach, but of making even minor correction from a slightly "off" approach when the pilot has limited information and visual cues as to his position and distance away from the ramp (ship's stern). The white flood-lighted deck affords some relief from this harrowing condition. Carrier approaches must be near perfect every time. What happens if the pilot goes low is vividly demonstrated at the end of this film.

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